Congratulations! You passed!

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1. What do you think applying this filter to a grayscale image will do? 1 / 1 point

$$\begin{bmatrix} -1 & -1 & 2 \\ -1 & 2 & 1 \\ 2 & 1 & 1 \end{bmatrix}$$

- Detect horizontal edges.
- Detect 45-degree edges.
- Detecting image contrast.
- Detect vertical edges.

Expand

Correct
Correct. Notice that there is a high delta between the values in the top left part and the ones in the bottom right part. When convolving this filter on a grayscale image, the edges forming a 45-degree angle with the horizontal will be detected.

2. Suppose your input is a 128 by 128 color (RGB) image, and you are not using a convolutional network. If the first hidden layer has 64 neurons, each one fully connected to the input, how many parameters does this hidden layer have (including the bias parameters)? 1 / 1 point

- 1048640
- 3145728
- 3145792
- 1048576

Expand

Correct
Correct, the number of inputs for each unit is $128 \times 128 \times 3$ since the input image is RGB, so we need $128 \times 128 \times 3 \times 64$ parameters for the weights and 64 parameters for the bias parameters, thus $128 \times 128 \times 3 \times 64 + 64 = 3145792$.

3. Suppose your input is a 300 by 300 color (RGB) image, and you use a convolutional layer with 100 filters that are each 5x5. How many parameters does this hidden layer have (including the bias parameters)? 1 / 1 point

- 7600
- 2600
- 7500
- 2501

Expand

Correct
Correct, you have $25 \times 3 = 75$ weights and 1 bias per filter. Given that you have 100 filters, you get 7,600 parameters for this layer.

4. You have an input volume that is $127 \times 127 \times 16$, and convolve it with 32 filters of 5×5, using a stride of 2 and no padding. What is the output volume? 1 / 1 point

- $62 \times 62 \times 16$
- $123 \times 123 \times 32$

62 × 62 × 32

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Expand

Correct

Correct, using the formula $n_H^{[l]} = \frac{n_H^{[l-1]} + 2 \times p - f}{s} + 1$ with $n_H^{[l-1]} = 127, p = 0, f = 5$, and $s = 2$ we get 62.

5. You have an input volume that is 31x31x32, and pad it using "pad=1". What is the dimension of the resulting volume (after padding)? 1 / 1 point

- 33x33x33
- 33x33x32
- 31x31x34
- 32x32x32

Expand

Correct

Yes, if the padding is 1 you add 2 to the height dimension and 2 to the width dimension.

6. You have an input volume that is 63x63x16, and convolve it with 32 filters that are each 7x7, and stride of 1. You want to use a "same" convolution. What is the padding? 1 / 1 point

- 7
- 3
- 2
- 1

Expand

Correct

Correct, you need to satisfy the following equation: $n_H - f + 2 \times p + 1 = n_H$ as you want to keep the dimensions between the input volume and the output volume.

7. You have an input volume that is 32x32x16, and apply max pooling with a stride of 2 and a filter size of 2. What is the output volume? 1 / 1 point

- 16x16x16
- 15x15x16
- 16x16x8
- 32x32x8

Expand

Correct

Correct, using the following formula: $n_H^{[l]} = \frac{n_H^{[l-1]} + 2 \times p - f}{s} + 1$

8. Which of the following are hyperparameters of the pooling layers? (Choose all that apply) 0 / 1 point

- [x] Whether it is max or average.

Correct

Yes, these are the two types of pooling discussed in the lectures, and choosing which to use is considered a hyperparameter.

- [ ] Number of filters.

- [ ] Average weights.
- [ ] Filter size.

Expand

Incorrect
You didn't select all the correct answers

9. In lecture we talked about “parameter sharing” as a benefit of using convolutional networks. Which of the following statements about parameter sharing in ConvNets are true? (Check all that apply) **1 / 1 point**

- [ ] It allows parameters learned for one task to be shared even for a different task (transfer learning).
- [x] It allows a feature detector to be used in multiple locations throughout the whole input image/input volume.

Correct
Yes, by sliding a filter of parameters over the entire input volume, we make sure a feature detector can be used in multiple locations.

- [x] It reduces the total number of parameters, thus reducing overfitting.

Correct
Yes, a convolutional layer uses parameter sharing and usually has a lot less parameters than a fully-connected layer.

- [ ] It allows gradient descent to set many of the parameters to zero, thus making the connections sparse.

Expand

Correct
Great, you got all the right answers.

10. The sparsity of connections and weight sharing are mechanisms that allow us to use fewer parameters in a convolutional layer making it possible to train a network with smaller training sets. True/False? **1 / 1 point**

- ( ) False
- (•) True

Expand

Correct
Yes, weight sharing reduces significantly the number of parameters in a neural network, and sparsity of connections allows us to use a smaller number of inputs thus reducing even further the number of parameters.